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Ward et al.

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(54) **THROTTLE PEDAL ASSEMBLY**

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B60K 26/04	(2006.01)
F02D 11/04	(2006.01)
G05G 1/44	(2008.04)
B60K 26/02	(2006.01)

(52) **U.S. Cl.**

CPC ***B60K 26/04*** (2013.01); ***F02D 11/04*** (2013.01); ***G05G 1/30*** (2013.01); *B60K 26/02* (2013.01); *B60K 2026/043* (2013.01); *G05G 1/44* (2013.01)

(58) **Field of Classification Search**

CPC G05G 1/30; G05G 1/44; B60K 26/02

See application file for complete search history.

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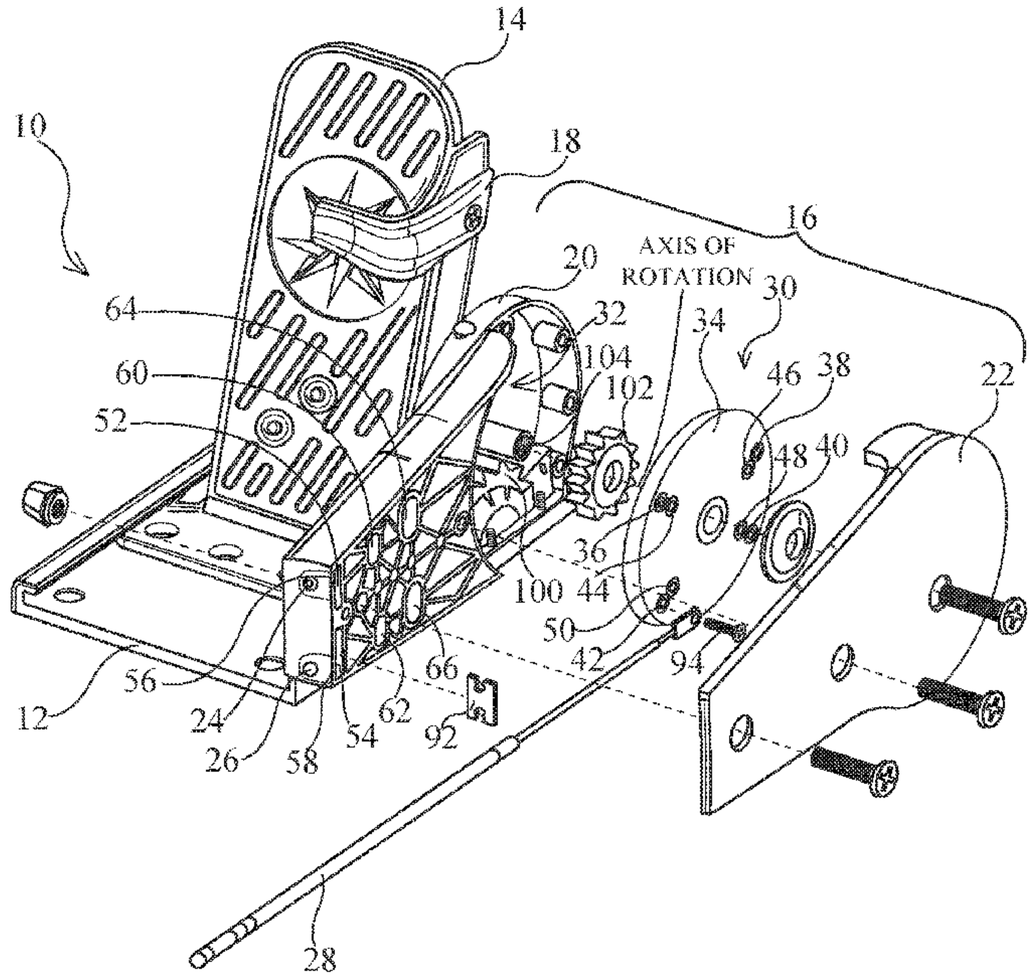
Primary Examiner — Richard W Ridley
Assistant Examiner — Brian J McGovern

(57) **ABSTRACT**

A throttle pedal assembly comprises a base, a pedal pivotably mounted on the base, and a gear box coupled to the pedal. The gear box has a throttle wheel with a plurality of throttle cable terminal attachment locations and the gear box has a plurality of throttle cable mounting locations. A throttle cable is selectively and releasably attached to one of said plurality of throttle cable terminal attachment locations, and the throttle cable is selectively and releasably attached to one of said plurality of throttle cable mounting locations.

8 Claims, 11 Drawing Sheets



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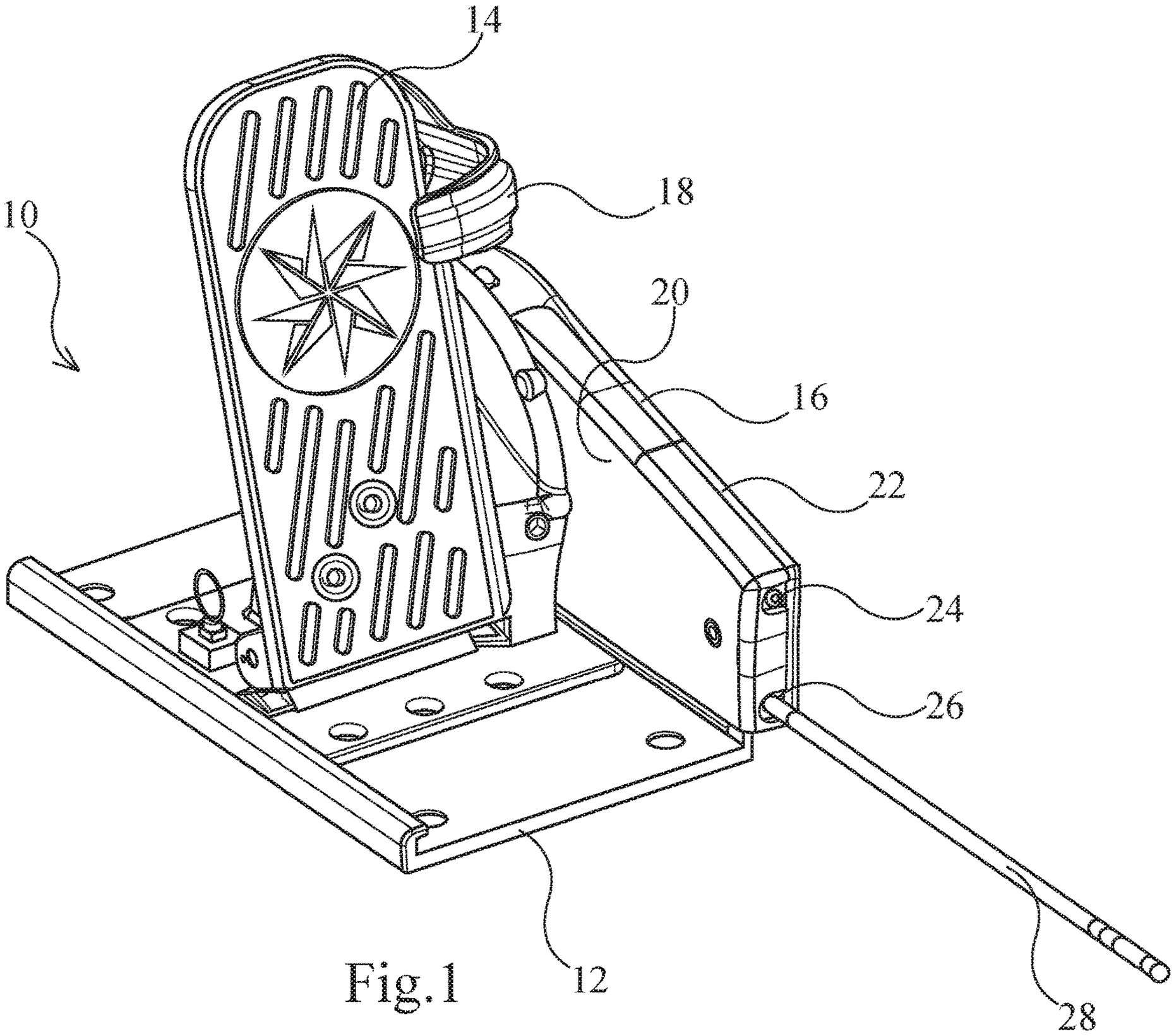


Fig. 1

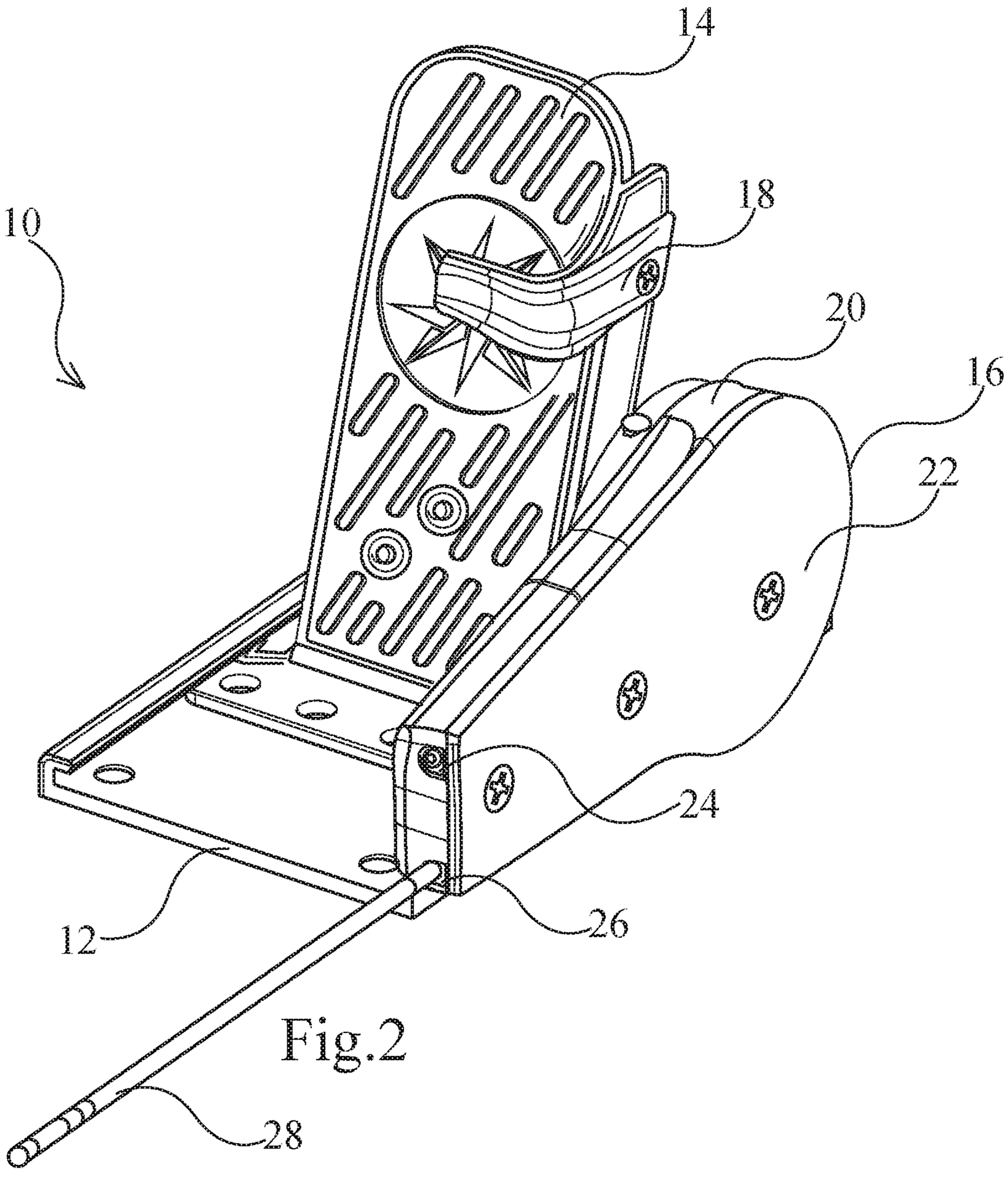
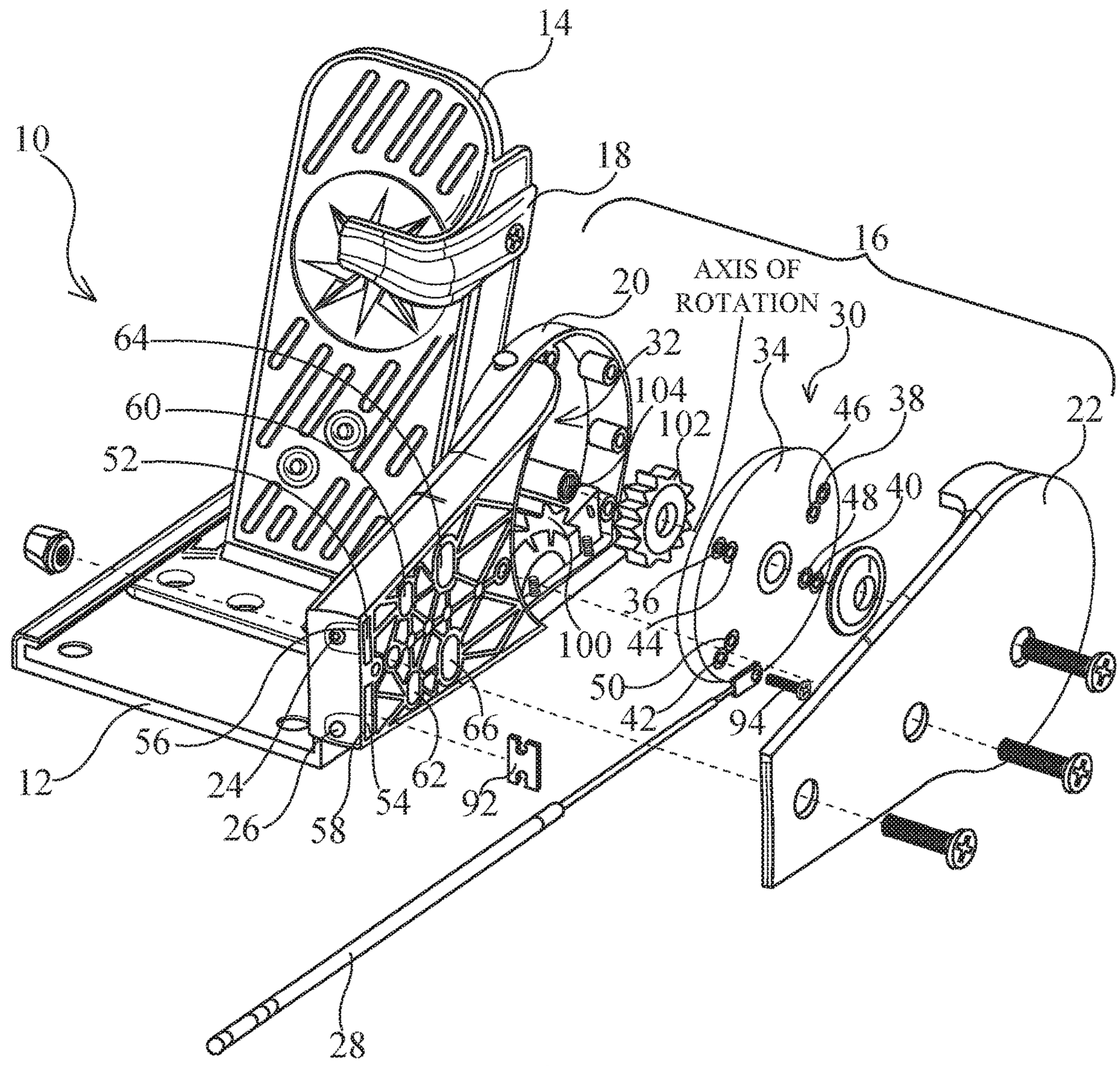


Fig.2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AXIS OF ROTATION
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Fig.3

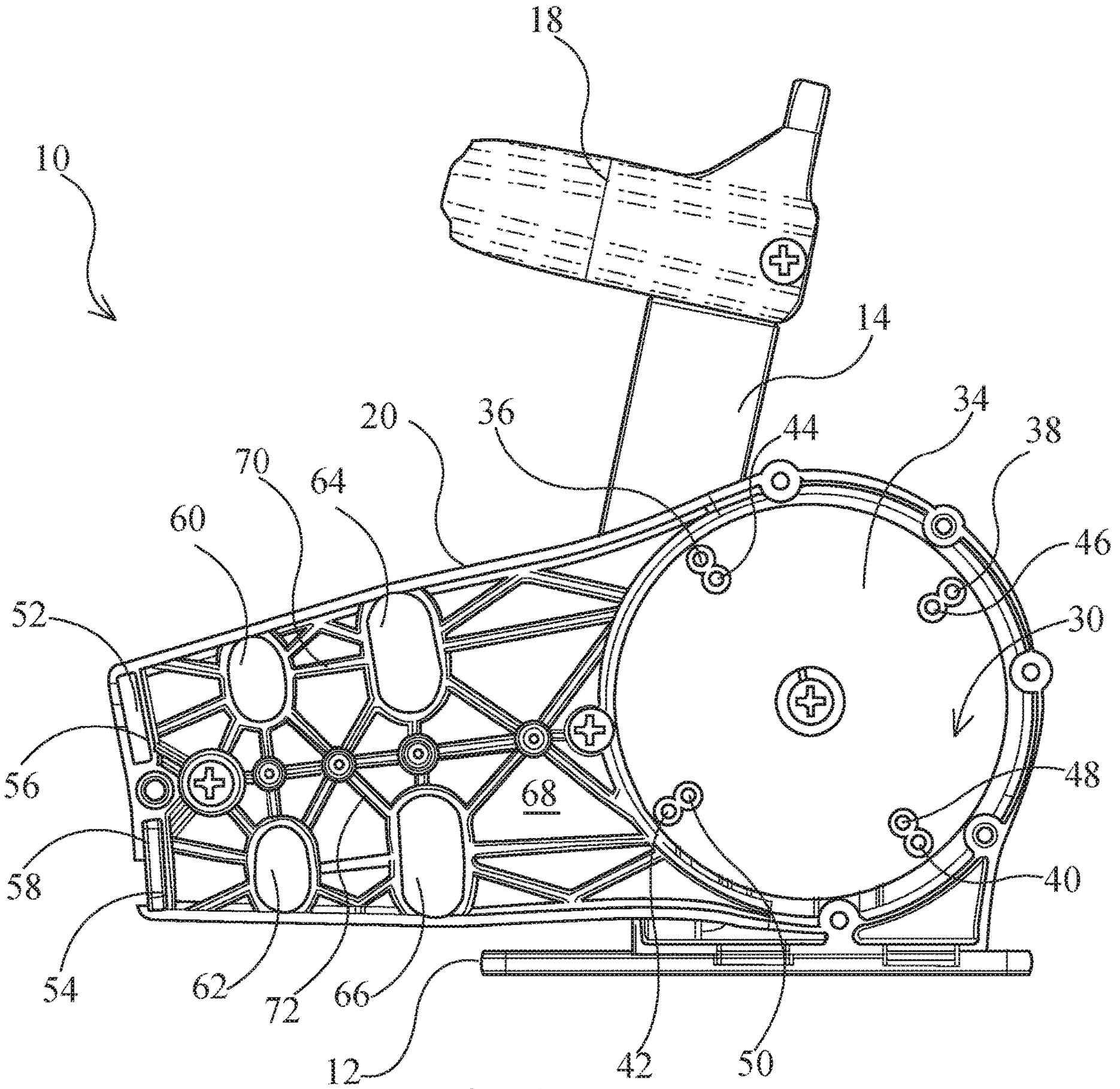
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Fig.4

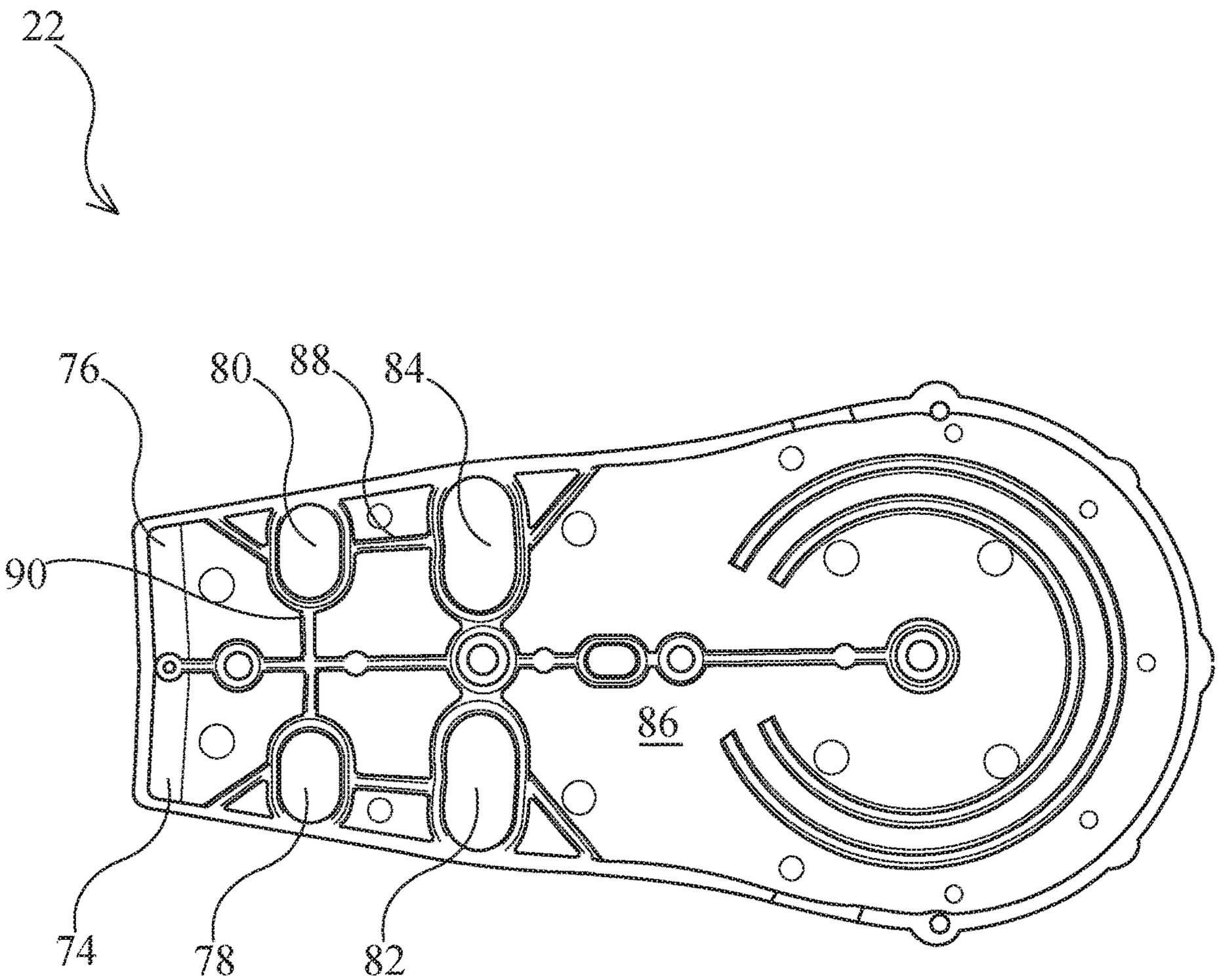

Fig.5

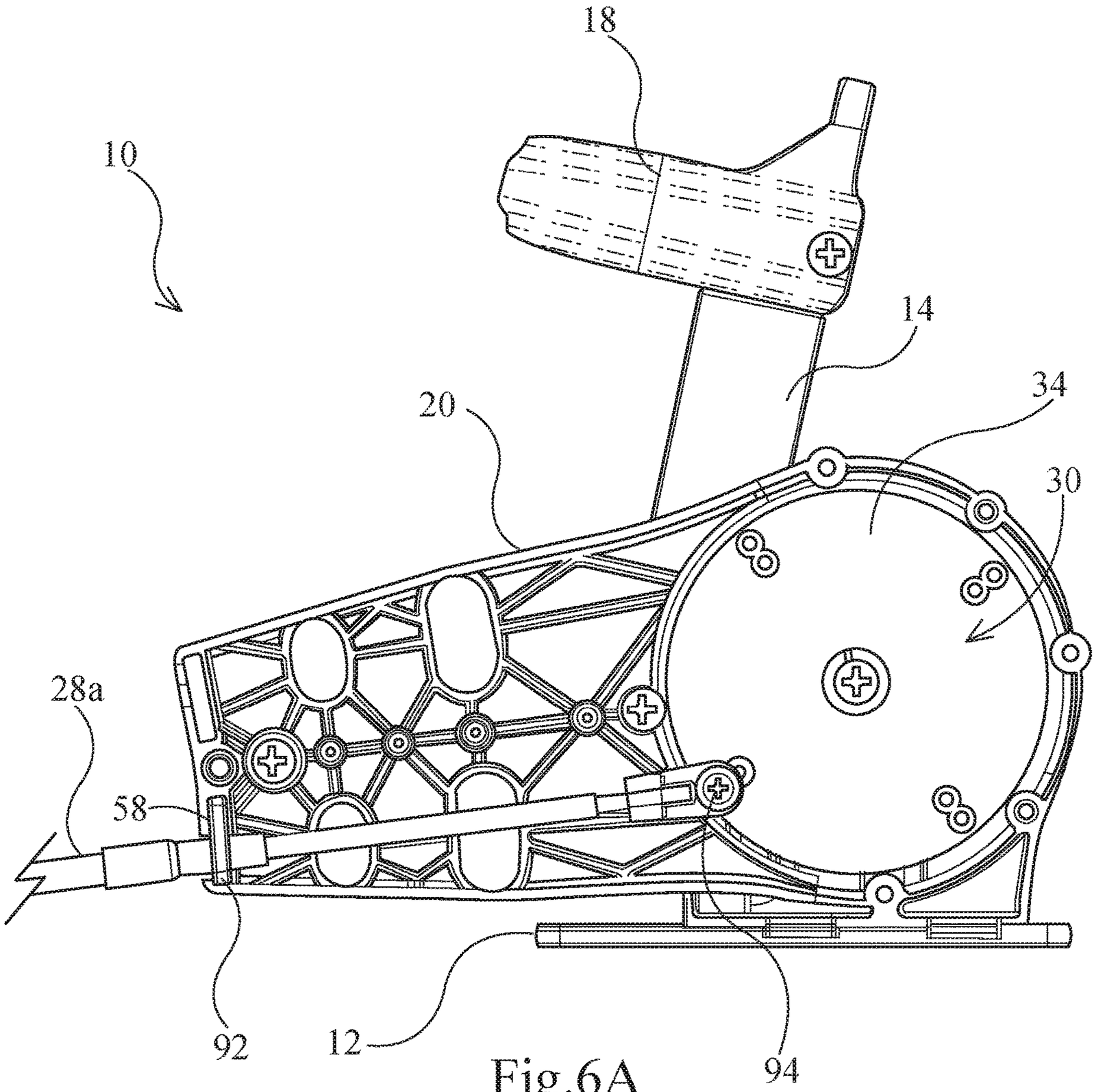

Fig.6A

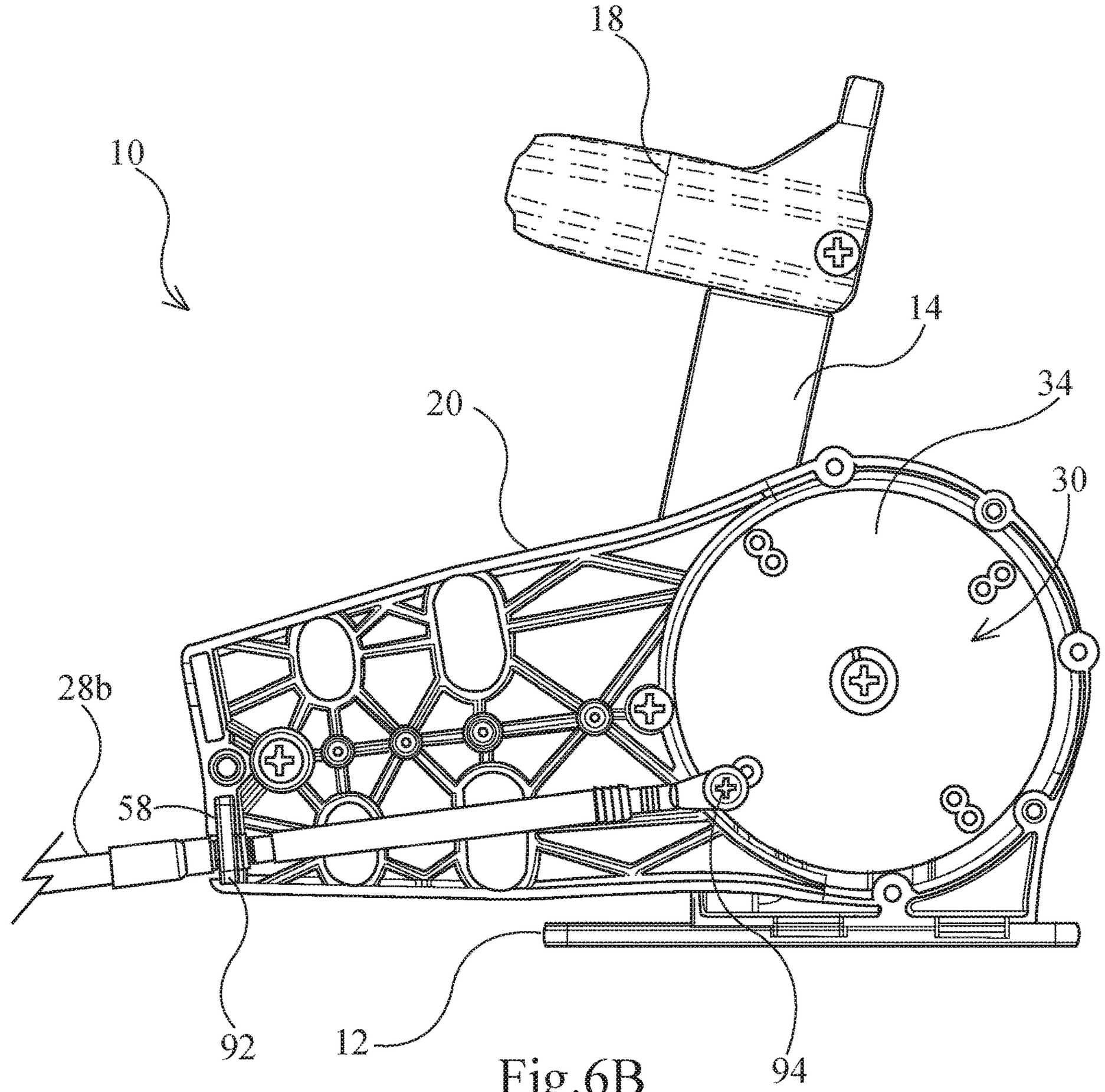

Fig.6B

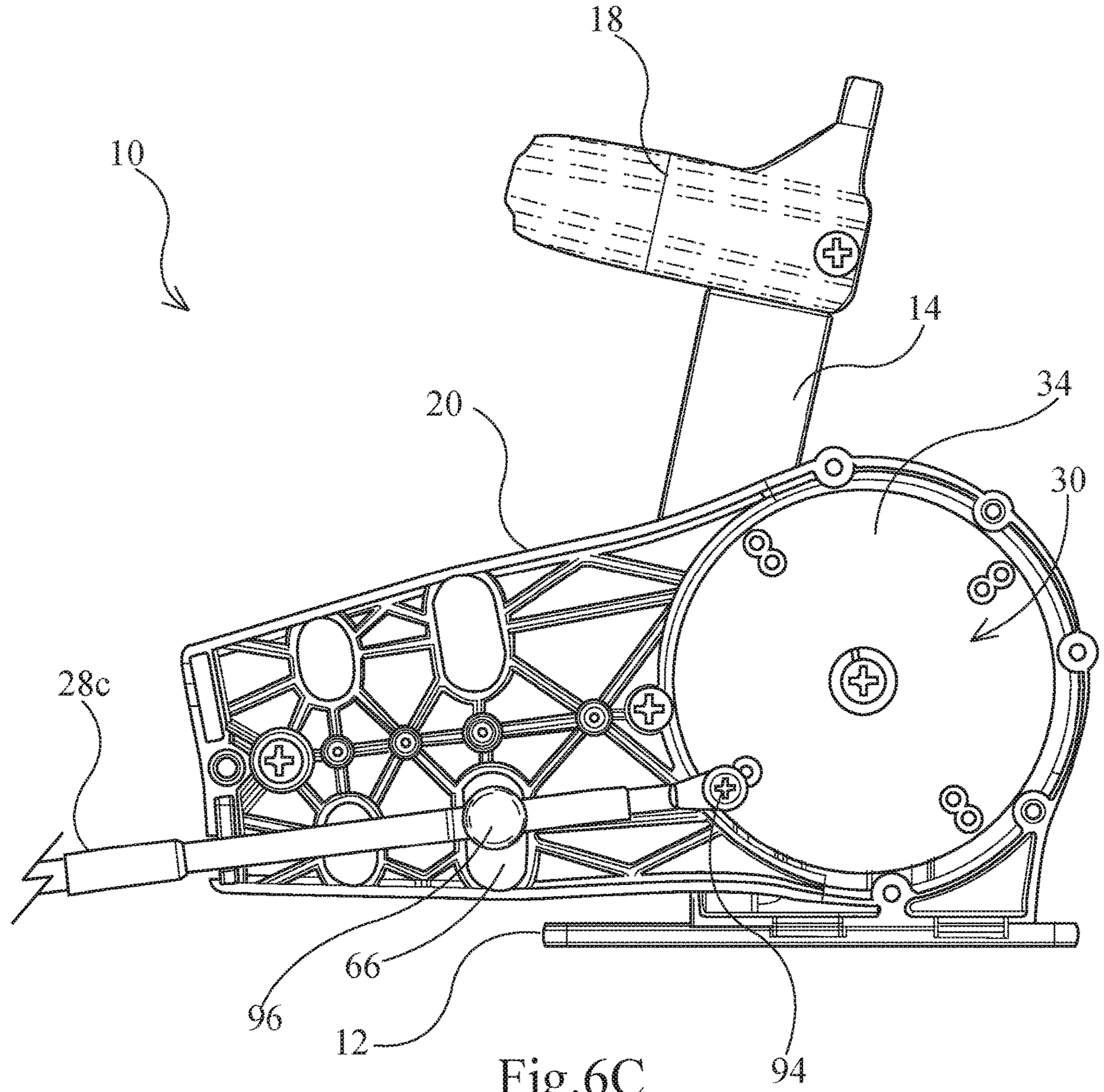

Fig.6C

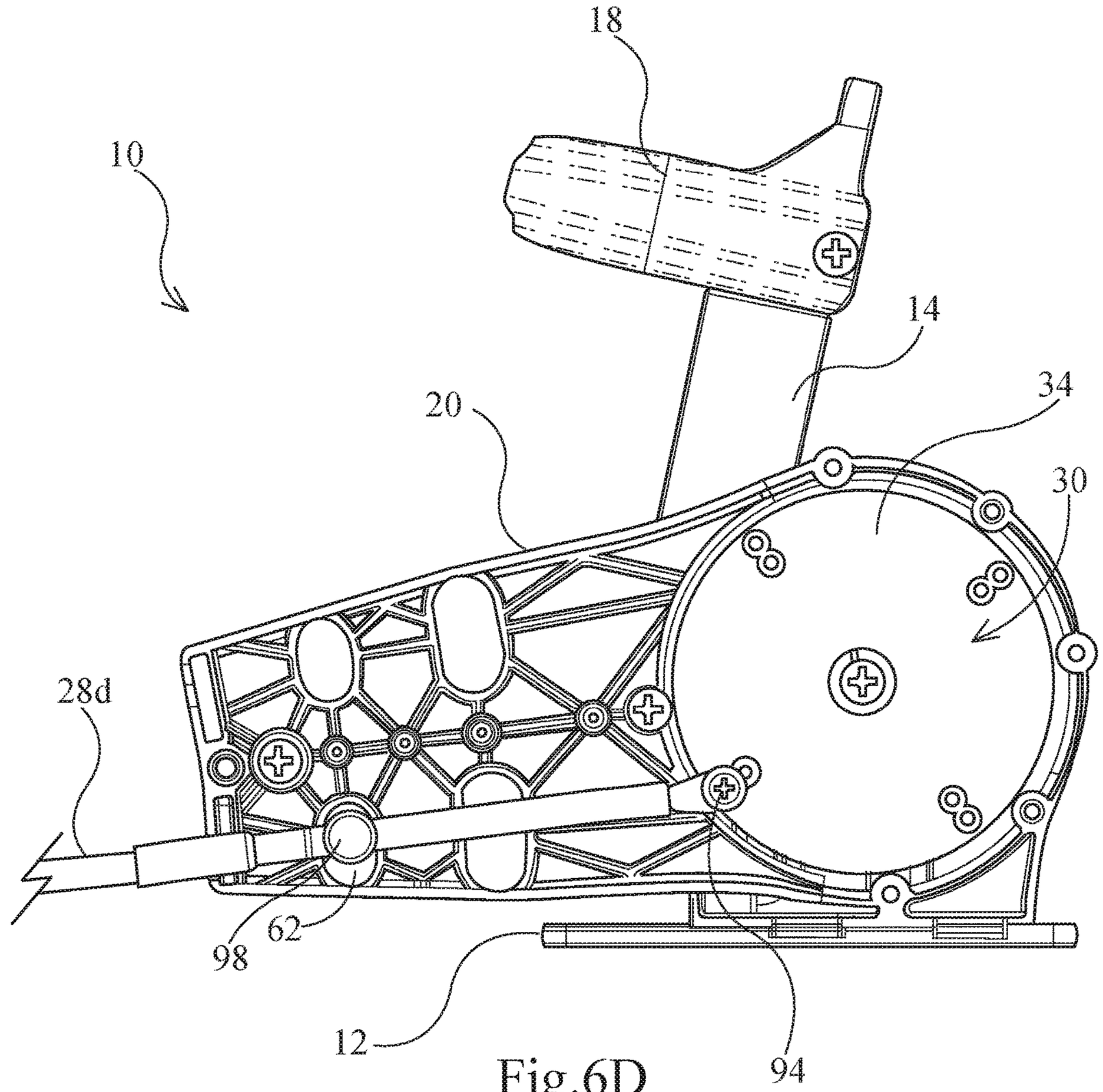

Fig.6D

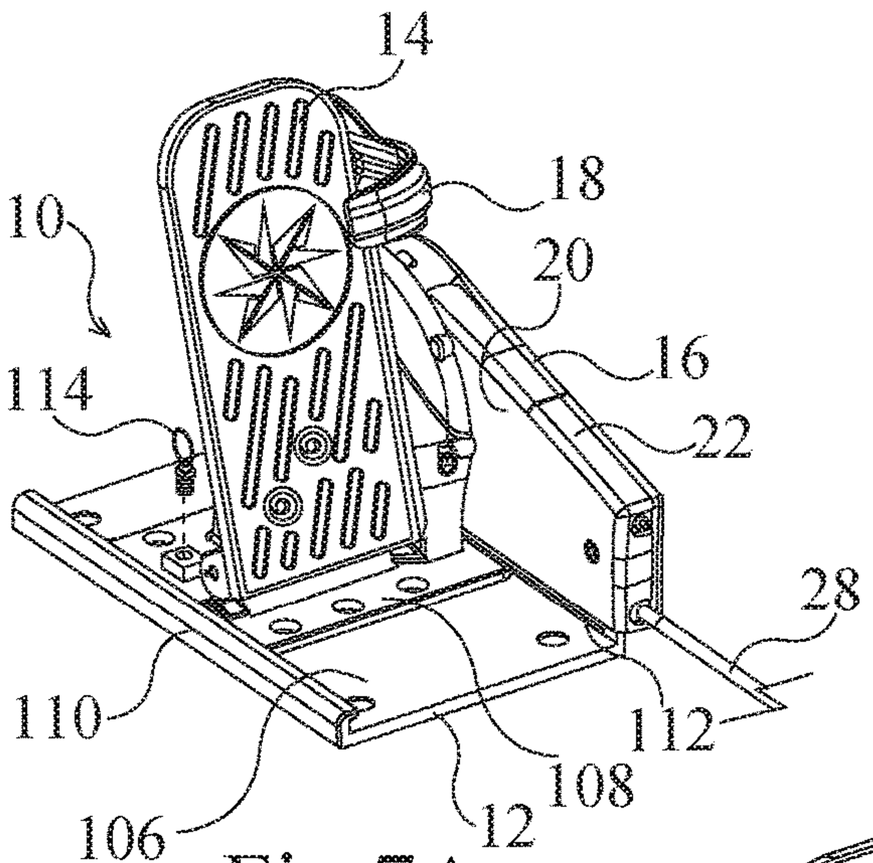

Fig.7A

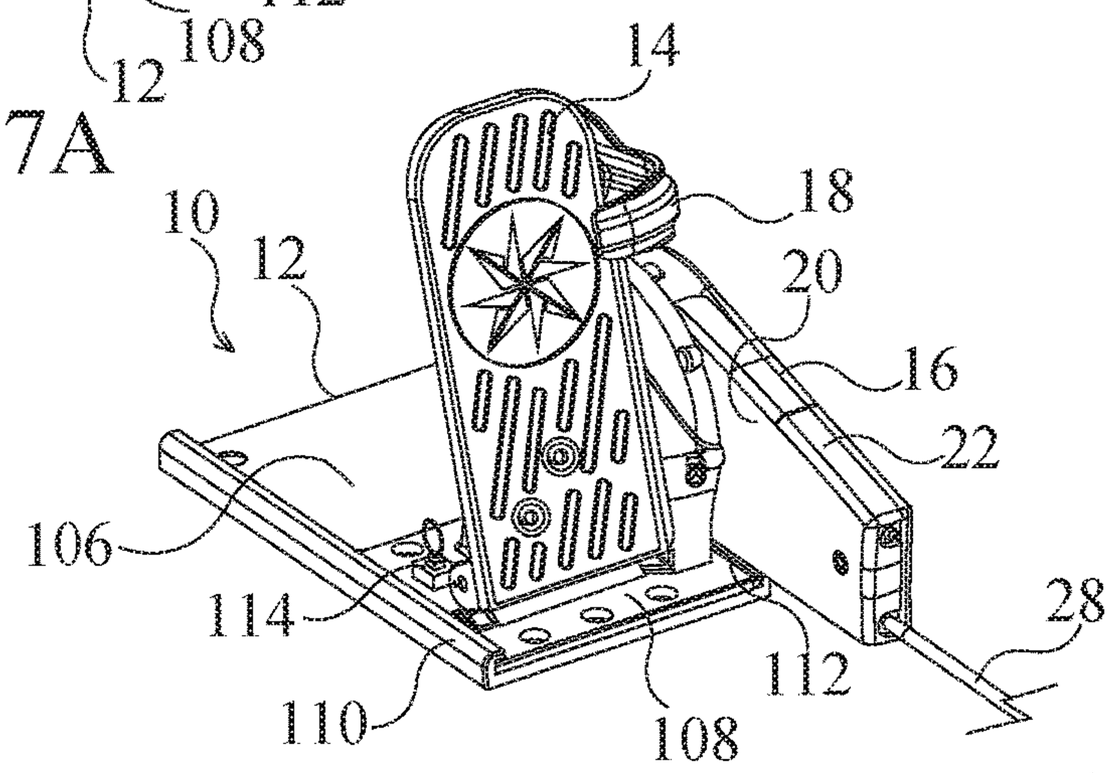

Fig.7B

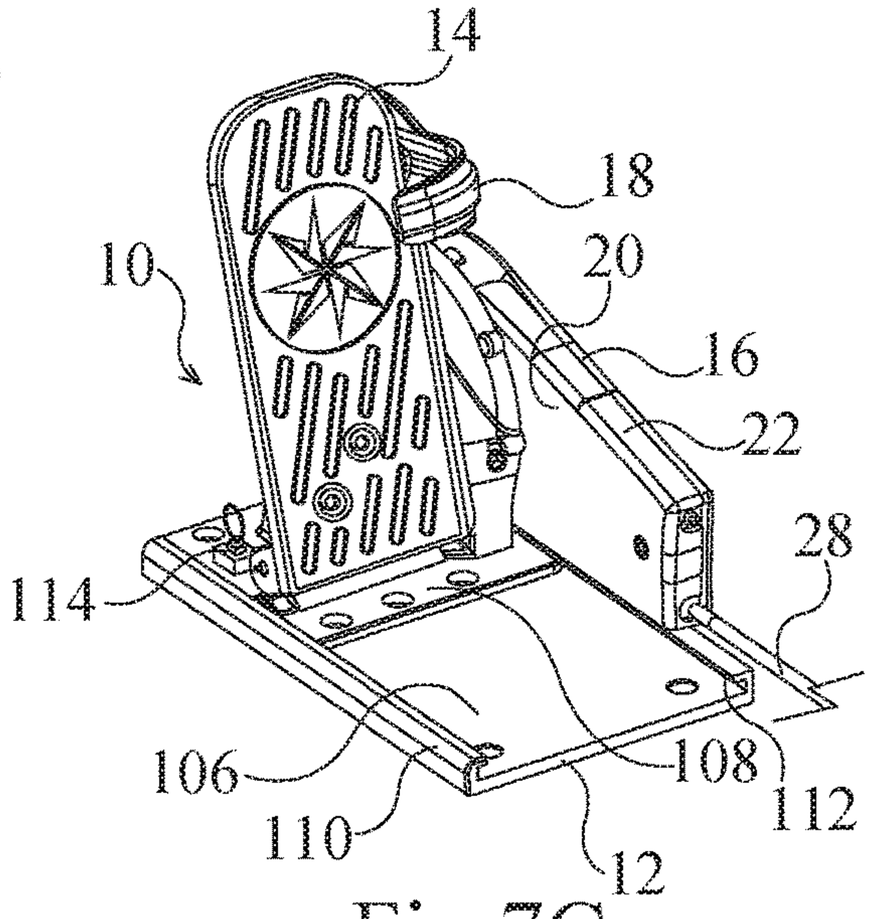

Fig.7C

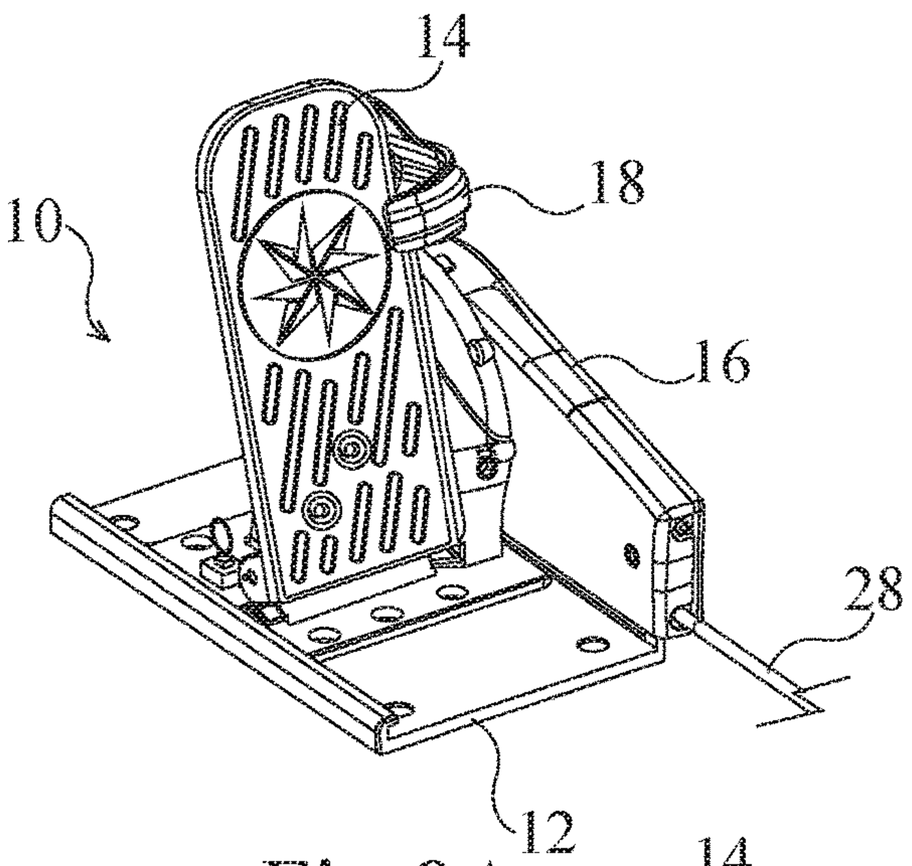

Fig.8A

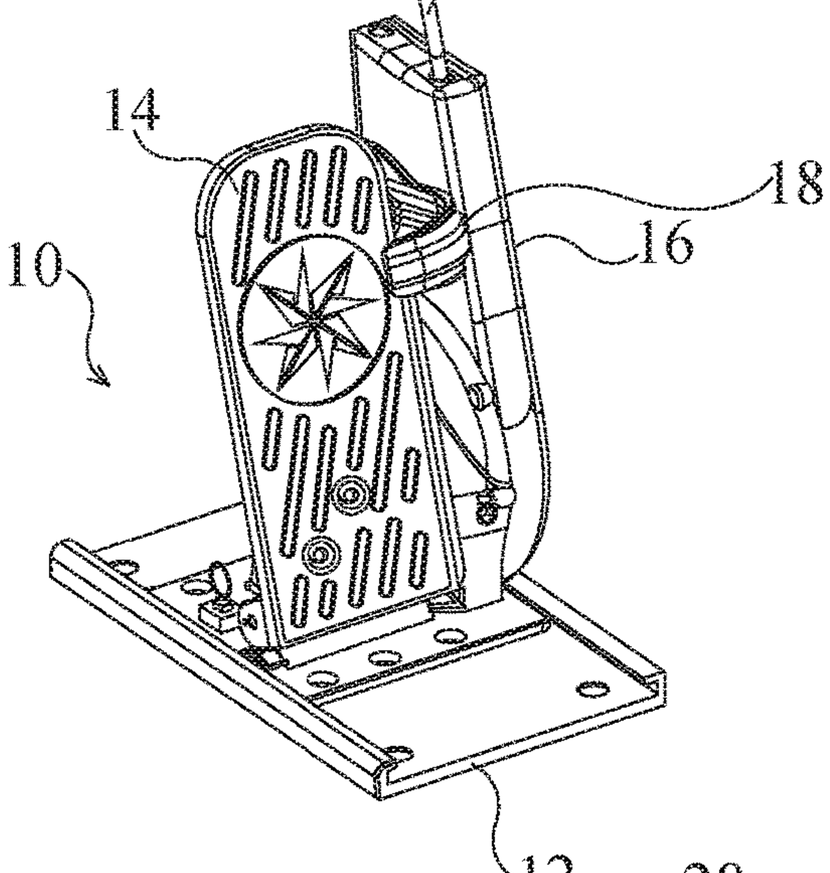

Fig.8B

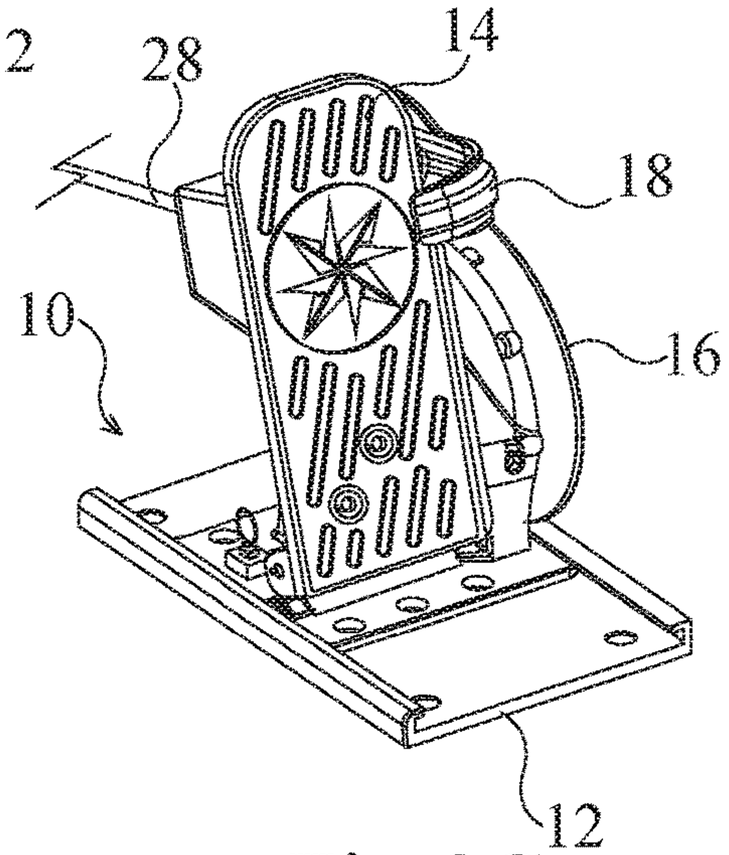

Fig.8C

THROTTLE PEDAL ASSEMBLY

This application claims priority of U.S. Provisional Application No. 62/725,178, filed Aug. 30, 2018, the entire content of which is hereby incorporated by reference.

TECHNICAL FIELD

The present disclosure relates to a throttle pedal assembly and, in particular, to a throttle pedal assembly having a throttle wheel with a plurality of throttle cable terminal attachment locations.

U.S. Pat. No. 2,985,031 which issued on May 23, 1961, in the name of Bennett discloses a remote control to be actuated by foot for control of outboard motors. The remote control comprises a base and a plurality of adjustable legs mounted on the base. There is a pad on each leg. The pads are substantially universally adjustable relative to the legs for application to a contoured surface. There is a pivoted foot treadle mounted on the base, a sector gear on the base, a link connecting said foot treadle to said sector gear to oscillate the latter, a rack, and means on the base to rectilinearly guide and constrain the rack. The sector gear is in engagement with the rack to move the same. There is a motor control cable secured to the rack for actuation thereby in conformance to the motion of the treadle.

U.S. Pat. No. 6,058,796 which issued on May 9, 2000, in the name of Huntley discloses a foot throttle for boats. An eccentric is rotated by operation of a foot pedal and wherein the eccentric is biased directly against an adjustable limiter thus eliminating imprecise positioning of the throttle caused by loose tolerances in the pedal mechanism which actuates the eccentric.

SUMMARY

There is provided a throttle pedal assembly comprising a base, a pedal pivotably mounted on the base, and a gear box coupled to the pedal. The gear box has a throttle wheel with a plurality of throttle cable terminal attachment locations and the gear box has a plurality of throttle cable mounting locations. A throttle cable is selectively and releasably attached to one of said plurality of throttle cable terminal attachment locations, and the throttle cable is selectively and releasably attached to one of said plurality of throttle cable mounting locations.

The throttle wheel may have an axis of rotation. The throttle cable terminal attachment locations may define an inner race and an outer race about the axis of rotation. The gear box may have a housing and a housing cover. The cable mounting locations may be keyed into a wall of the housing or a wall of the housing cover or both. The pedal may be coupled to the gear box by a cable actuation mechanism which drives the throttle wheel. The cable actuation mechanism and the throttle wheel may be disposed within a housing of the gear box. The base may include a base plate and a slider plate which is slidable relative to the base plate. The pedal may be mounted on the slider plate. The base may be provided with a detent to maintain the slider plate in a desired location relative to the base plate. An orientation point of the throttle cable may be adjusted by pivoting the gear box relative to the pedal.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more readily understood from the following description of the embodiments thereof given, by way of example only, with reference to the accompanying drawings, in which:

FIG. **1** is a front perspective view of a throttle pedal assembly;

FIG. **2** is another front perspective view of the throttle pedal assembly;

FIG. **3** is an exploded perspective view of the throttle pedal assembly;

FIG. **4** is a side elevation view of the throttle pedal assembly with a housing cover of a gear box removed;

FIG. **5** is a side elevation view of the housing cover of the gear box;

FIGS. **6**A to **6**D are side elevation views of the throttle pedal assembly with a housing cover of a gear box removed and a throttle cable attached to the throttle wheel and mounted to a cable mounting locations;

FIGS. **7**A to **7**C are side elevation views of the throttle pedal assembly as shown in FIG. **3** with an output orientation of the throttle cable adjusted; and

FIGS. **8**A to **8**C are front elevation views of the throttle pedal assembly as shown in FIG. **3** with an output orientation of the throttle cable adjusted.

DESCRIPTION OF SPECIFIC EMBODIMENTS

Referring to the drawings and first to FIGS. **1** and **2**, there is shown a throttle pedal assembly **10** which generally comprises a base **12**, a pedal **14** pivotally mounted on the base **12**, and a gear box **16** coupled to the pedal **14**. The pedal **14** is provided with a toe hook **18**, in this example, but this is not required. The gear box **16** includes a housing **20** and a housing cover **22**. There are openings **24** and **26** in the housing **20** through which a throttle cable **28** may extend. Referring now to FIG. **3**, the housing **20** houses a cable mounting mechanism **30** and a cable actuation mechanism **32**. The housing **20** and the housing cover **22** restrict the introduction of foreign material that may interfere with the operation of the throttle pedal assembly **10** and, in particular, with the operation of the cable mounting mechanism **30** and the cable actuation mechanism **32** when the throttle pedal assembly **10** is in use.

In this example, the cable mounting mechanism **30** includes a throttle wheel **34** having a plurality of throttle cable terminal attachment locations, for example, throttle cable terminal attachment locations **36**, **38**, **40**, **42**, **44**, **46**, **48** and **50** as defined below.

36	High Resolution Cable Terminal Attachment Location A
38	High Resolution Cable Terminal Attachment Location B
40	High Resolution Cable Terminal Attachment Location C
42	High Resolution Cable Terminal Attachment Location D
44	Low Resolution Cable Terminal Attachment Location A
46	Low Resolution Cable Terminal Attachment Location B
48	Low Resolution Cable Terminal Attachment Location C
50	Low Resolution Cable Terminal Attachment Location D

The cable terminal attachment locations **36**, **38**, **40**, **42**, **44**, **46**, **48** and **50** rotate about a fixed axis of rotation and relative movement between the cable terminal attachment locations **36**, **38**, **40**, **42**, **44**, **46**, **48** and **50** and defined cable pivot locations **52** and **54** generate linear motion of the throttle cable **28**. The attachment of the throttle cable **28** to different ones of the throttle cable terminal attachment locations **36**, **38**, **40**, **42**, **44**, **46**, **48** and **50** enables the adjustment of the sensitivity and stiffness of the throttle pedal assembly **10**. Each of the cable terminal attachment locations **36**, **38**, **40**, **42**, **44**, **46**, **48** and **50** is defined by a concentric circle that generates a moment arm about the rotational axis of the throttle wheel **34**. The cable terminal

attachment locations **36**, **38**, **40** and **42** define an outer race. The cable terminal attachment locations **44**, **46**, **48** and **50** define an inner race. There is more sensitivity and higher perceived actuation load when the throttle cable **28** is attached to an outer race. There is less sensitivity and lower perceived actuation load when the throttle cable **28** is attached to an inner race.

The cable mounting mechanism **30** also includes a plurality of throttle cable mounting locations **56**, **58**, **60**, **62**, **64** and **66** as defined, for example, below.

56 30 Series Cable and Mercury Generation II Cable Mounting Location A
58 30 Series Cable and Mercury Generation II Cable Mounting Location B
60 OMC Cable Mounting Location A
62 OMC Cable Mounting Location B
64 Mercury Generation I Cable Mounting Location A
66 Mercury Generation I Cable Mounting Location B

Referring now to FIG. **4**, the throttle cable mounting locations **56**, **58**, **60**, **62**, **64** and **66** may be channels and/or keying features on an inner wall **68** of the housing **20**. There may also be strengthening ribs, for example, strengthening ribs **70** and **72** on the inner wall **68** of the housing **20**. There are, as shown in FIG. **5**, corresponding complementary throttle cable mounting locations **74**, **76**, **78**, **80**, **82** and **84** on an inner wall **86** of the housing cover **22**. The complementary throttle cable mounting locations **74**, **76**, **78**, **80**, **82** and **84** may likewise be channels and/or keying features. There may also be strengthening ribs, for example, strengthening ribs **88** and **90** on the inner wall **86** of the housing cover **22**. The throttle cable mounting locations **56**, **58**, **60**, **62**, **64** and **66**, on the inner wall **68** of the housing **20**, and the complementary throttle cable mounting locations **74**, **76**, **78**, **80**, **82** and **84**, on the inner wall **86** of the housing cover **22**, allow the throttle pedal assembly **10** to interface with commonly available marine grade push/pull cables, as shown in FIGS. **6**A to **6**B, which may be employed as the throttle cable without the need for aftermarket components.

FIG. **6**A shows a throttle cable **28***a* which, in this example, is a 30 Series Cable mounted at mounting location **58** on the housing **20** by a retainer clip **92**. It will be understood by a person skilled in the art that the throttle cable **28***a* is also mounted at mounting location **74**, shown in FIG. **5**, on the housing cover **22**. The throttle cable **28***a* is connected to the throttle wheel **34** by a screw **94**. FIG. **6**B shows a throttle cable **28***b* which, in this example, is a Mercury Generation II Cable mounted at mounting location **58** by the retainer clip **92**. It will be understood by a person skilled in the art that the throttle cable **28***b* is also mounted at mounting location **74**, shown in FIG. **5**, on the housing cover **22**. The throttle cable **28***b* is connected to the throttle wheel **34** by the screw **94**. FIG. **6**C shows a throttle cable **28***c* which, in this example, is a Mercury Generation II Cable mounted by its barrel **96** at mounting location **66** on the housing **20**. It will be understood by a person skilled in the art that the throttle cable **28***c* is also mounted by its barrel **96** at mounting location **82**, shown in FIG. **5**, on the housing cover **22**. The throttle cable **28***c* is also connected to the throttle wheel **34** by the screw **94**. FIG. **6**D shows a throttle cable **28***d* which, in this example, is an OMC Cable mounted by its barrel **98** at mounting location **62** on the housing **20**. It will be understood by a person skilled in the art that the throttle cable **28***d* is also mounted by its barrel **98** at mounting location **78**, shown in FIG. **5**, on the housing cover **22**. The throttle cable **28***d* is also connected to the throttle wheel **34** by the screw **94**. It will further be understood by a person skilled in the art that, in other examples, the throttle cable mounting locations may be for other types of cables.

Referring back to FIG. **3**, the cable actuation mechanism **32** includes a segment gear **100** and a spur gear **102**. The segment gear **100** is rigidly mounted on the pedal **14** and the spur gear **102** is rigidly mounted on the throttle wheel **34**. The spur gear **102** and the throttle wheel **34** are concentrically and rotatably mounted on a shaft **104** which is coaxial with the axis of rotation. The segment gear **100** engages the spur gear **102** and pivoting of the pedal **14** accordingly rotates the throttle wheel **34** which, in turn, moves a terminal end of the throttle cable **28** through a defined arc segment. This movement, together with the virtual axis of the throttle cable **28**, results in linear motion of the throttle cable **28** to throttle an engine.

FIGS. **7**A to **7**C show that the base **12** of the throttle pedal assembly **10** includes a base plate **106** and a slider plate **108**. The base plate **106** is provided with rails **110** and **112** which receive the slider plate **108**. The base plate **106** is configured to be mounted on a floor of a vehicle, for example a marine vessel, and the slider plate **108** is able to slide relative to the base plate **106**. The pedal **14** is mounted on the slider plate **106** and is accordingly also able to slide relative to the base plate **106**. This allows the pedal to be positioned in a desired location relative to the base plate **106**. The throttle pedal assembly **10** is further provided with a detent, in form of a locating boss **114**, which engages with the base plate **106** and the slider plate **108** to maintain the pedal **14** in a desired position. The locating boss **114** may be released to allow the pedal **14** to be re-positioned and the locating boss **114** may be subsequently re-engaged to maintain the pedal **14** in position. This allows the throttle pedal assembly **10** to be mounted in different configurations.

An output orientation of the throttle cable **28** may also be adjusted by pivoting the gear box **16** as shown in FIGS. **8**A to **8**C. For example, the output orientation of the throttle cable **28** may be routed rearward towards a stern of the marine vessel as shown in FIG. **8**A, or upward into a console or gunwale as shown in FIG. **8**B, or forward toward a bow of the marine vessel as shown in FIG. **8**C. This allows the throttle pedal assembly **10** to be mounted in different configurations.

It will be understood by a person skilled in the art that many of the details provided above are by way of example only, and are not intended to limit the scope of the invention which is to be determined with reference to the following claims.

What is claimed is:

1. A throttle pedal assembly comprising:
a base;
a pedal pivotably mounted on the base; and
a gear box coupled to the pedal, the gear box having a throttle wheel with a plurality of throttle cable terminal attachment locations and the gear box having a plurality of throttle cable mounting locations, wherein a throttle cable is selectively attached to one of said plurality of throttle cable terminal attachment locations and the throttle cable is selectively attached to one of said plurality of throttle cable mounting locations.

2. The throttle pedal assembly as claimed in claim **1** wherein the throttle wheel has an axis of rotation and said of plurality throttle cable terminal attachment locations define an inner race and an outer race about the axis of rotation.

3. The throttle pedal assembly as claimed in claim **1** wherein the gear box has a housing and a housing cover, and

the cable mounting locations are keyed into a wall of the housing or a wall of the housing cover or both.

4. The throttle pedal assembly as claimed in claim **1** wherein the pedal is coupled to the gear box by a cable actuation mechanism which drives the throttle wheel.

5. The throttle pedal assembly as claimed in claim **4** wherein the cable actuation mechanism and the throttle wheel are disposed within a housing of the gear box.

6. The throttle pedal assembly as claimed in claim **1** wherein the base includes a base plate and a slider plate which is slidable relative to the base plate, and the pedal being mounted on the slider plate.

7. The throttle pedal assembly as claimed in claim **6** wherein the base is provided with a detent to maintain the slider plate in a desired location relative to the base plate.

8. The throttle pedal assembly as claimed in claim **1** wherein an output orientation of the throttle cable is adjusted by pivoting the gear box relative to the pedal.

* * * * *